How to Perform Your GPS Investigation

Preparing for Your GPS Measurements

Study Site for the Investigation

We want your students to determine the latitude, longitude, and elevation of their school, the center of their GLOBE Study Site, and of their Atmosphere, Land Cover, Biology, Hydrology, Soil Characterization, and Soil Moisture Study Sites. The GLOBE Program will make a hand-held Global Positioning System satellite receiver available to you. See Figure 6-2. Before borrowing a receiver you should determine locations for the following GLOBE measurements:

Places for GPS Measurements

Study Site	GPS measurement location
Land Cover	Center of each 90m x 90m site of land cover assessment
Biology	Center of site of repeated biometry measurements
Hydrology	Water-sampling site
Soil Characterization	Soil sample location
Soil Moisture	Soil sample location
Atmosphere	Instrument enclosure
School	Main entrance

The Atmosphere Study Site should provide a good view of the sky and thus good satellite reception, but the Hydrology and Biology Study Sites may offer poor GPS reception due to heavy canopy cover. To resolve this problem, refer to the GLOBE GPS Learning Activity: "Offset GPS Measurements."

Frequency

The latitude, longitude and elevation of each of your study sites as determined by GPS technology needs to be performed and *submitted only once*.

Instrumentation for the GPS Measurement

The GLOBE Program owns GPS receivers which are maintained by the University Navstar Consortium (UNAVCO). To borrow a GPS receiver, U.S. schools should direct their requests to UNAVCO. Country coordinators may request to borrow GPS receivers from UNAVCO for use by their non-U.S. partner GLOBE schools. Requests should be sent to:

Web: http://www.unavco.ucar.edu/
e-mail: globe@unavco.ucar.edu
phone: (303) 497-8000
fax: (303) 449-7857
address: UNAVCO/UCAR
PO Box 3000
Boulder, CO 80307-3000

Please return borrowed receivers to:
UNAVCO/UCAR
3340 Mitchell Lane, Suite 393
Boulder, CO 80301

You might have access to other GPS receivers through local outdoor enthusiasts or surveyors. But be sure they meet the specifications stipulated in the Toolkit. Some schools have even purchased their own GPS receivers. Because of our limited number of receivers and our desire to have you use available instruments, data received from other brands of GPS receivers is acceptable. In any case, identify your receiver when you enter your GPS position data into the Web data entry page.

The variation of GPS location service used by the GLOBE Program is specified to provide an accuracy of 100 meters by the United States government GPS service. See the list of tutorial GPS Internet sites for more details. UNAVCO learned that averaging 15 measurements taken at one minute intervals with the GPS receiver typically can reduce this error to less than 30 meters.

The engineers who built and programmed your GPS receiver determine your location by inferring the distances to four or more satellites by knowing the locations of the satellites and by measuring the differences, in billionths of a second, in timing signals broadcast from these satellites. Many of the details of how the GPS system determines your location are spread throughout the learning activities.